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Papers Presented at Advisory Group for Aerospace Research and Development (AGARD) Symposium on Machine Intelligence for Aerospace Electronic Systems

Background. On 13-16 May 1991, the 61st Symposium of the Avionics Panel was held in Lisbon, Portugal. A large amount of research is being conducted to develop and apply machine intelligence (MI) technology to aerospace applications. The MI research covers the technical areas under the headings of artificial intelligence, expert systems, knowledge representation, neural networks, and machine learning. This list is not all inclusive. This research could alter dramatically the design of aerospace electronics systems because MI technology enables automatic or semiautomatic operation and control. Some of the application areas where MI is being considered include sensor cuing, data and information fusion, command/control/communications/intelligence, navigation and guidance, pilot aiding, spacecraft and launch operations, and logistics support for aerospace electronics. For many routine jobs, it appears that MI systems could totally displace human operators. In other situations, MI systems would provide screened and processed data as well as recommended courses of action to human operators. The MI technology will enable electronic systems or subsystems that adapt or correct for errors. Many of the paradigms have parallel implementation or use intelligent algorithms to increase the speed of response to near real time. The symposium focused on applications research and development to determine the types of MI paradigms that are best suited to the wide variety of aerospace electronics applications.

To obtain copies of the following papers, contact the Office of Naval Research European Office:

1. **Machine Intelligence for Survivable Communications Network Management**
   Mr. Nick P. Kowalchuk, Rome Air Development Center (AFSC), United States (U.S.)
2. **A Distributed Environment for Testing Cooperating Decision Aids**
   CAPT Jeffrey D. Grimshaw, USAF, and Mr. Craig S. Anken, Rome Air Development Center (AFSC), U.S.
3. **Heuristic Route Optimization: A Model for Force Level Route Planning**
   LT Janet L. Barboza, USAF, Rome Air Development Center (AFSC), U.S.
4. **Advance Satellite Workstation**
   Thomas E. Bleier, Stewart Sutton and Sidney Hollander, The Aerospace Corporation, U.S.
5. **A Synergistic Approach to Reasoning for Autonomous Satellites**
   CAPT James M. Skinner, USAF, Air Force Space Technology Center, and Prof. George F. Luger, University of New Mexico, U.S.
6. **Spacecraft Electrical Power System Fault Detection/Diagnosis and Resource Management**
   Mr. Peter J. Adamovits, Canadian Space Agency, Mr. Eric Jackson, International Submarine Engineering Ltd., and Mr. Breen Liblong, Alberta Research Council, Canada (CA)
7. **TACAID - A Knowledge Based System for Tactical Decision Making**
   Dr. Kevan Roberts, British Aerospace plc, U.K.
8. **Automated Threat Response Recommendation in Environments of High Data Uncertainty Using the Countermeasure Association Technique (CMAT)**
   Mr. George B. Chapman, Mr. Robert J. Burdick, and Dr. Glenn E. Johnson, Mission Research Corporation, U.S.
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   Dr. Arthur G. Self and Mr. Gregory P. Bourassa, M.E.L. Defence Systems, Ltd., CA
10. **Neural Network Solutions to Mathematical Models of Parallel Search for Optimal Trajectory Generation**
    Lyle A. Reibling, Smiths Industries Aerospace & Defense Systems Inc., U.S.
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    Automatic Target Recognition Using Neural Network Methods
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12. **Localisation de la Menace: une Découverte Majeure pour les Systèmes Intelligents de Guerre Electronique**
    Threat Localization: A Major Breakthrough for Intelligent EW Systems
    Jacques Franquet and Christian Maillard, Dassault Electronique, FR
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    Mr. Colin Daysh, Mr. Malcolm Corbin, Mr. Geoff Butler, Royal Aerospace Establishment, U.K., Mr. Eugene L. Duke, NASA, U.S., and Mr. Steven D. Belle and Mr. Randal W. Brumbaugh, PRC Systems Services, U.S.
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18. **Système Expert Intégré à bord des Avions de Combat pour l'Evaluation des Performances en Temps Réel**
    Combat Aircraft Embedded Expert System for Real-Time Performances Assessment
    Daniel Servel, Patrick Lahalle and Andre Havre, Dassault Electronique, FR

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Ir. J. C. Donker, National Aerospace Laboratory NLR, NE

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